PYTHON FOR COMPUTATIONAL PROBLEM SOLVING

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Process of Computational Problem Solving

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PYTHON FOR COMPUTATIONAL PROBLEM SOLVING

Topics covered in the previous session

- Digital Computer
- Computer Hardware
- Operating System
- Computer Software
- Syntax, semantics and program translation

PYTHON FOR COMPUTATIONAL PROBLEM SOLVING

Topics to be covered in this session

- Process of Computation Problem Solving
  - Analysis,
  - Design,
  - Implementation &
  - Testing

- Introduction to Python Programming Language
- First program in Python

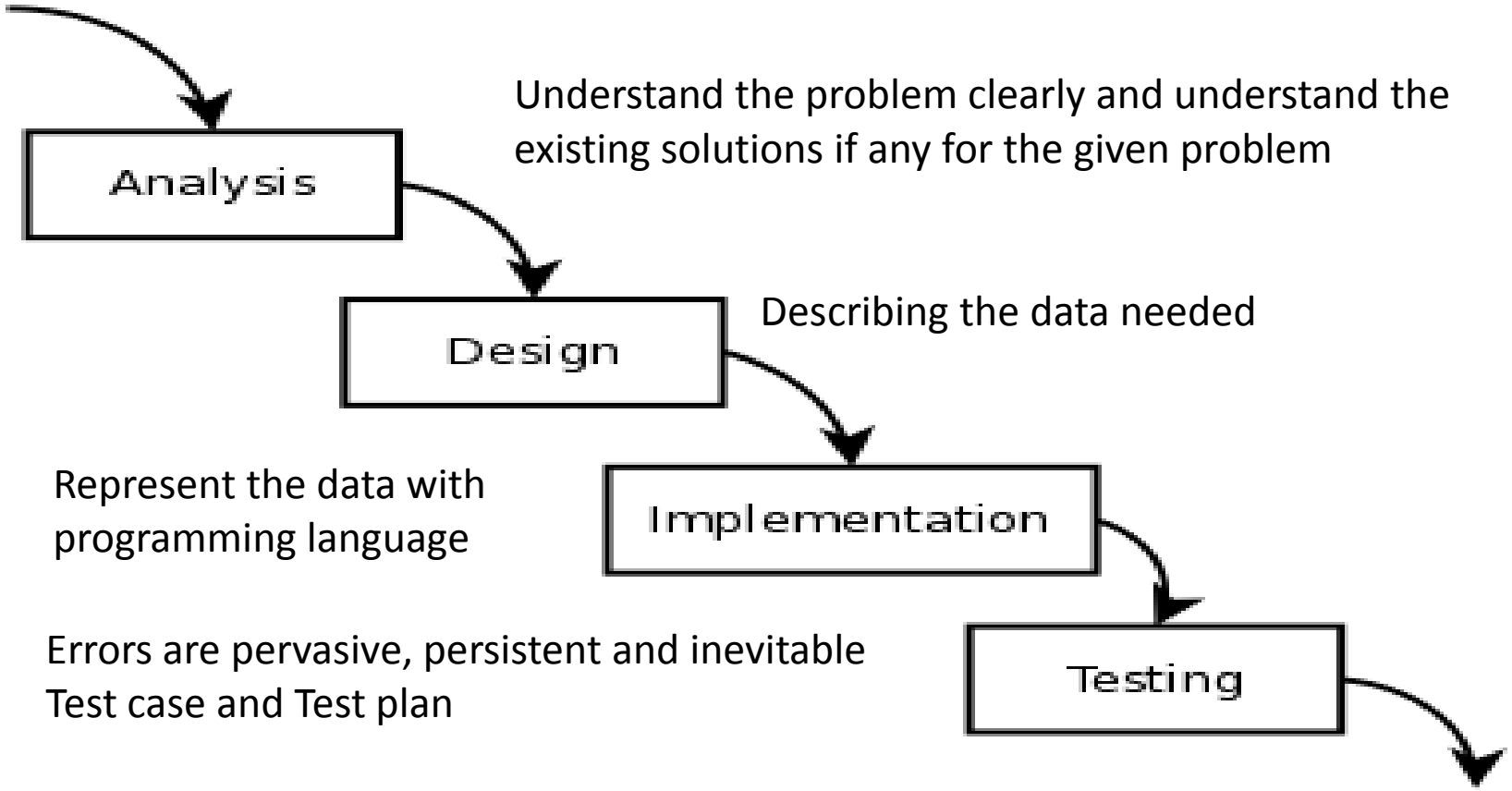
Process of Computation Problem Solving

- **Computational problem solving** does not simply involve the act of computer programming.

- It is a *process*, with programming being only one of the steps.
- Before a program is written, a design for the program must be developed.
- And before a design can be developed, the problem to be solved must be well understood.
- Once written, the program must be thoroughly tested.

PYTHON FOR COMPUTATIONAL PROBLEM SOLVING

Process of Computation Problem Solving



Process of Computation Problem Solving

Problem Analysis:

- Must understand the fundamental computational issues involved.

- Example:

  For MCGW problem, can use brute-force approach of trying all of the possible rowing actions that may be taken

Process of Computation Problem Solving

Knowing what constitutes a solution.

For some problems, there is only one solution. For others, there may be a number (or infinite number) of solutions. Thus, a problem may be stated as finding,

- **A solution**
- **An approximate solution**
- **A best solution**
- **All solutions**

Process of Computation Problem Solving

Describe Data and Algorithms

- For the **MCGW problem**, need to store the current state of the problem.

- When solving a computational problem, either suitable existing algorithms may be found, or new algorithms must be developed.

Process of Computation Problem Solving

Program Implementation

- Design decisions provide general details of the data representation and the algorithmic approaches for solving a problem.
- The details, however, do not specify which programming language to use, or how to implement the program.
- That is a decision for the implementation phase.

Process of Computation Problem Solving

Program Implementation

Since we are programming in Python, the implementation needs to be expressed in a syntactically correct and appropriate way, using the instructions and features available in Python.

Process of Computation Problem Solving

Program Testing

Writing computer programs is difficult and challenging. As a result, **programming errors are pervasive, persistent and inevitable**.

Given this fact, **software testing is a crucial part of software development**. Testing is done incrementally as a program is being developed, when the program is complete, and when the program needs to be updated.

Process of Computation Problem Solving

Facts of Software Development

- Programming errors are pervasive, persistent, and inevitable.
- Software testing is an essential part of software development.
- Any changes made in correcting a programming error should be fully understood as to why the changes correct the detected error.

PYTHON FOR COMPUTATIONAL PROBLEM SOLVING

Few Questions?

- What is programming?
- Why should we learn program?
- What is a programming language?
- How does a computer understand a program in a high level language?
- What is Python?
- Why learn Python?

THANK YOU

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